Jare p. 57

LIST OF THE DESCRIBED PLANTS OF PERMO-CARBONIFEROUS AND MESOZOIC AGE IN TASMANIAN ROCKS, SHOWING DISTRIBUTION IN THE VARIOUS FORMATIONS.

COMPILED BY R. M. JOHNSTON, F.L.S.

FOSSIL PLANTS.		MESOZOIC.			PERMO-CARBONIFEROUS (UPPER PALÆOZOIC).						
		Upper Coal Measures.	Ida Bay Coal Measures.	Lower Sandstones (Lower Mesozoic).	Southport Beds.	Mount Cygnet Coal Measures.	Adventure Bay Coal Measures.	Upper Marine Beds.	Lower Coal Measures.	Tasmanite Beds.	Lower Marine Beds.
FILICES.											
Alethopteris Australis	*Morris*	—									
,, serratifolia	*R. M. Johnston*	—									
Cardiopteris Tasmanica	,,	—									
Cyclopteris? Australis*	,,	—									
Danæa Morrisiana	,,	—									
Gangamopteris augustifolia	*McCoy*								—		
,, cyclopteroides, var. attenuata	*Feistm.*								—		
,, ,, ,, sub-auriculata	,,								—		
,, obliqua	*McCoy*						—		—		
,, spathulata	,,						—		—		
Gleichenia dubia	*Feistm.*	—									
Glossopteris ampla	,,								—		
,, Browniana	,,						—		—		
,, communis	,,								—		
,, elongata	,,								—		
,, reticulum	,,								—		
,, moribunda	*R. M. Johnston*	—									
,, ovata	,,								—		
,, spathulato-cordata	*Feistm.*								—		
Macrotæniopteris wianamattæ	,,	—									
Neuropteris antipoda	*R. M. Johnston*	—									
,, Tasmaniensis	,,	—									
Odontopteris crispata	,,	—									
Pecopteris Buftoni	,,	—									
,, caudata	,,	—									
,, Lunensis	,,		—			—					
,, odontopteroides	*Morris*	—									
Rhacophyllum coriaceum	*R. M. Johnston*	—									
Sagenopteris Tasmanica	*Feistm.*	—									
Sphenopteris Morrisiana	*R. M. Johnston*	—									
Sphenopteris flexuosa	*McCoy*	—									
,, *germana*	,,	—									
,, *hastata*	,,	—									
,, *lobifolia*	*Morris*	—									
,, *plumosa*	*McCoy*	—									
Sphenopteris alata	*Brongt*	—									
,, elongata	*Carruthers*	—									
,, Tasmanica	*R. M. Johnston*	—									
Strzeleckia gangamopteriodes	,,	—									
,, tenuifolia	,,	—									
Tæniopteris Morrisiana	,,	—									
,, Tasmanica	,,	—									
Thinnfeldia Buftoni	,,	—									
,, Feishmantelli	,,	—									
,, obtusifolia	,,	—									
,, media	*T. Woods*	—									
,, polymorpha	*R. M. Johnston*	—									
,, superba	,,	—									
,, trilobita	,,	—									
Trichomanidas ettingshanseni	,,	—									
,, spinifolium	*T. Woods*	—									
EQUISITACEÆ.											
Annularia Australis	*Morris*	—									
Phyllotheca Australis	*Brongt*										
,, Hookeri	*McCoy*										
,, ramosa	,,										
LYCOPUDIACEÆ.											
Lepidostrobus Muelleri	*R. M. Johnston*										
Knorria sp.†	,,										
Tasmanites punctatus	*Newton*										—
CYCADACEÆ.											
Podozamites distans?	*Presé*	—									
Pterophyllum dubia	*R. M. Johnston*	—									
,, Risdonensis	,,	—									
,, Strahani	,,	—									
Sphenozamites Feistmantelii	,,	—									
Ptilophyllum oligoneurum	*T. Woods*	—									
CONIFERÆ.											
Baiera tenuifolia	*R. M. Johnston*	—									
Ginkgophyllum Australis	,,	—									
Noggerathiopsis Hislopi	*Feistm.*									—	
,, media	,,									—	
,, prisca?	,,									—	
Salisburia Hobartensis	*R. M. Johnston*	—									
Zeugophyllites (Poa-Cordaites) elongatus	*Morris*	—		—							
AFFINITIES UNCERTAIN.											
Carpolithes Tasmanicus	*R. M. Johnston*									—	
Cryptophyllites Tasmanica	,,								—		
Endogenophyllites Wellingtonensis	*McCoy*										
Samaropsis sp.										—	
Squamæ gymnospermarum	*Feist*										
Vertebraria Australis	*McCoy*			—	—		—				

* Possibly a Salisburia. † Locality and horizon unknown. NOTE.—*Sagenopteris salisburioides* to add to list.

FURTHER CONTRIBUTIONS TO THE HISTORY OF THE FOSSIL FLORA OF TASMANIA.

Part II.

By R. M. Johnston, F.L.S.

(*Read May 20th*, 1895.)

The second of this series of contributions to the history of our Fossil Flora refers largely to collections of plants made by the Rev. J. Bufton, F.L.S., from Upper Mesozoic coal measures shales in the neighbourhood of Dunally, which collection this accomplished naturalist kindly placed at my disposal. It will be seen from the notes, descriptions, and figures which follow that I have been enabled by these collections to add to the list several interesting plant forms new at least to our Tasmanian Fossil Flora.

With one or two of the forms, new to science, it has afforded me great pleasure to associate the name of the discoverer.

I am indebted also to my friend, A. Montgomery, M.A., F.G.S., our Government Geologist, for more perfect specimens of three species of undescribed, or imperfectly described, fossil plants occurring in the coal measures of Fingal, Seymour, and York Plains.

By the more perfect examples, thus obtained, I have been enabled to add a new genus to our list (*Strzeleckia*) of Mesozoic plants, and also three new species. I had long been on the outlook for perfect examples of these forms, which I recognised many years ago; but the specimens in my possession hitherto were too imperfect to determine their specific characters satisfactorily.

I have also added to the list one or two interesting forms obtained by myself some years ago from shales of Upper Mesozoic Age at Lord's Hill, New Town, and elsewhere.

I have in a separate table prepared a complete classified list of all the species of fossil plants known to me of Permo-carboniferous and Mesozoic Age which have been described to date, including those new forms described in this contribution. This table (embracing 75 species) is also arranged to show what I now conceive to be the probable order of succession of the principal groups and formations; and against each are recorded their respective floras for the benefit of the stratagraphist and the mining expert.

Strzeleckia, nov. gen.

Frond simple; form variable; now equilateral or inequilateral; now oblique, falcate, or symmetrical; now elongate-

lanceolate, elongate-spathulate, or linear-lanceolate, and in rudimentary forms, frequently wide, inequilateral, oblique, and subtrigonal. In all forms there is a gradual tapering towards the base to a linear strap-shaped petiole, which is more or less amplexicaul; no mid-rib; nerves numerous, distinct, ascending from base, and from the crowded mid-rib-like central series, at a very acute angle to the margin, but *never anastomosing*. The central series become less crowded towards middle, and, towards apex, the central series spread out and diverge symmetrically as in the lateral series.

This genus—evidently a tufted form—comes near to *gangamopteris* in all characteristics, from which it is distinguished by the total absence of nerve anastomoses.

So far as known this genus is confined to the Upper Mesozoic coal measures, and occurs commonly in the upper coal measure shales at Mount Nicholas and Spring Bay.

Strzeleckia gangamopteroides. (Nov. sp. Figs. 5-7.)

Frond simple, variable, possessing all the characteristics of the genus, save that it is never linear, as in the following species.

Mature form generally broadest above the middle; apex obtusely pointed. Greatest length from 4 to $4\frac{1}{2}$ inches; greatest breadth, about three-quarters of an inch. Lateral or oblique rudimentary forms; greatest length, $2\frac{1}{4}$ inches; greatest breadth (middle), $\frac{7}{8}$ inch.

Locality, Mount Nicholas coal measures, Tasmania (common).

In Plate 26, Fig. 2, "Geology of Tasmania," I referred a doubtful form to *Pecopteris caudata* (Mihi), but the specimens thus referred to did not show the neuration clearly. I am now confident that it should be referred to *S. gangamopteroides.*

Strzeleckia tenuifolia. (Nov. sp. Fig. 8.)

Form simple, almost symmetrical, elongate, linear-lanceolate; apex obtusely accuminate, very gently narrowing to a long attenuate, and slightly oblique petiole. Nerves distinct, not so crowded as in the preceding species (*S. gangamopteroides*), ascending acutely to margin.

Greatest length $4\frac{1}{4}$ to $4\frac{1}{2}$ inches, greatest breadth $\frac{1}{8}$ inch.

Locality, Mount Nicholas coal measures, Tasmania (common).

Sphenopteris Morrisiana, (Nov. sp. Figs. 14, 15.)

Frond large (imperfect), bi-pinnate, deltoid, or lanceolate-deltoid, probably 2 to 3 feet long in completed state, and about 8 or 9 inches across towards base; *stipe*, rounded and

firm; *pinnæ*, somewhat distantly placed; spaces varying from $1\frac{1}{4}$ inches in the upper portion to $1\frac{1}{2}$ and even 2 inches in the lower, generally ascending in a gentle curve from rhachis at an angle of 45°-50°. *Pinnæ* broadly linear-lanceolate, opposite in the upper portion of frond and alternate in the lower. *Pinnules* numerous, somewhat distant, sub-opposite, variously lobed, linear-lanceolate and generally wavy or falciform. The series on upper side of rhachis are somewhat erect, and are directed towards apex of frond, overlapping about $\frac{3}{4}$ of the lower series, which curve forwards towards extremities at a more acute angle. Each pinnule gradually broadens towards base, where it is suddenly rounded and constricted, and becomes almost petiolate. The basal-lobe of upper side is bent or inflated into an auricle, whose lower margin runs almost parallel for some distance with the rhachis. The rounded basal-lobe of lower side is cut away more sharply. Each side of pinnule is incised to about half of its breadth by a number of ovately-rounded lobes, usually with a dentate or obscurely trilobate terminal. The number of pairs of lobes diminishes as the pinnæ approach apex of frond, where they are finally reduced to four, and even three pairs of lobes, with the usual dentate or obscurely trilobate terminal. The nerves vary with the lobes in the number and in complexity of furcation. Each pinnule is characterised by a firm wavy mid-rib, which only evanesces in the terminal lobe; from the mid-rib a single nerve ascends into each lobe, which rapidly spreads furcately. The number of nervures which reach the margin varies not only with the position of the pinnule on the frond, but also with the position of the lobe on the pinnule; in the pinnules towards base of frond the basal-lobe usually has 7 or 8 nervures, which in branching reach the margin. These gradually diminish in number towards terminal of pinnule, where usually only three or four nervures reach the margin, A similar diminution in the number of nervures reaching margin occurs in even the basal lobe of pinnules accordingly as we ascend the several pinnæ to the apex of frond.

I have described this handsome fern very minutely, especially as regards the number of lobes and nervures, as a number of species of this genus in Australia and Tasmania have already been described and recognised as distinct species upon small fragments of detached pinnules only, whose specific separation from each other is only based upon such small differences as occur together in different parts of the frond of the more perfect specimen now described by me as *S. Morrisiana*.

The first species so described by the late Professor John Morris (*S. lobata*) may well be included under the specific name covering a more complete specific description as now

given; and possibly also the following species:—*S. flexuosa*, *S. hastata*, *S. germana*, *S. plumosa*, originally described by Professor Sir Fred. M'Coy from isolated pinnule fragments, may yet be referred to the more complete type. I have thought it best, in order to avoid confusion with the older specific names, to associate the form described and figured by me with the name of the author of the first described fragment (S. lobata), viz., *Sphenopteris Morrisiana*, mihi.

Upper Mesozoic coal measure shales, Seymour, Tasmania.

Sphenopteris tasmanica. (Nov. sp. Figs. 10-13.)

Frond bi-pinnate, lanceolate, probably when complete 12-15 inches in length. *Stipe* generally erect, round, slender, undulating. *Pinnæ* opposite, numerous, closely placed, symmetrical, linear-lanceolate, falciform, tapering gently and curving upwards. There are about 15 pairs of pinnules on the larger pinnæ towards the middle of frond. *Pinnules* somewhat ovato-deltoid, opposite, decurrent, unsymmetrical, the upper base being extended into a small auricle, which slightly overlaps the lower and straighter cut-away base of succeeding pinnule; margins of pinnule simple; the uniformly auricled base of pinnules gives a winged appearance to the very slender thread-like stalks of pinnæ. *Nerves*, a single somewhat strongly marked flexuous nerve ascends from rhachis into each pinnule, branching dichotomously; generally two pairs of furcations reach margin on either side of pinnule, and one pair reaching the apex; but these branchings vary, both with the position of pinnule on pinnæ and on froud, the lower side of pinnule often having one or two nerves less than upon upper side. All these nervures are firm and well-defined.

Greatest breadth of frond, 3-3$\frac{1}{4}$ inches.
Greatest breadth of pinnæ, $\frac{1}{4}$-$\frac{5}{8}$ inch.
Greatest length of pinnule, $\frac{3}{16}$-$\frac{1}{4}$ inch.

This interesting fern was discovered by the writer several years ago in the upper coal measure shales (Mesozoic) at Lord's Hill, New Town, near Hobart. It is very distinct from any other species of this genus, and is extremely rare, as I have found no trace of it elsewhere throughout similar formations in Tasmania.

Pecopteris Buftoni. (Nov. sp. Fig. 3.)

Frond unknown. *Pinna* imparipinnate, lanceolate-ovate; pinnules or lobes simple, sub-ovate, with round or bluntish apices, curving gently upwards; the narrow rounded sinus between each lobe extends nearly to rhachis, forming thereby a continuous narrow wing to which each lobe or pinnule is attached by its whole breadth; margins thickened as if caused by the curvature of a continuous marginal sori; mid-

rib conspicuous; secondary veins concealed in a somewhat coriaceous integument.

Although the fragment is very imperfect, the above characters will serve to identify it, as it is very markedly distinct from any other allied forms described as occurring in Australia or Tasmania.

Collected by the Rev. J. Bufton from the Mesozoic shales of Dunally.

PECOPTERIS CAUDATA. (R. M. Johnston. Fig. 4.)

Fig. 4 is now referred by me to the above species. At first, owing to the more delicate structure and apparently finer neuration, I was inclined to separate it from the above species under the name *Pecopteris tonsorius*, but as this small difference may be due to habitat or to the medium in which it is preserved, I have thought it better to refer it for the present to my original species (P. caudata). The figure given is presented in natural size.

Locality.—Altered shales near East Bay Neck, Tasman Peninsula, Tasmania.

Collected by the Rev. J. Bufton, Dunally.

Thinnfeldia Buftoni. (Nov. sp. Fig. 18.)

Frond pinnatifid (? bi-pinnate); pinnæ nearly opposite, lanceolate, stromboido-lanceolate, falcate, accuminate; margin simple; the lower pinnæ probably shorter, giving the frond a broadly lanciform appearance; the upper side of base more or less roundly constricted, nearly auricled; the lower side of base also more or less constricted, and almost decurrent, giving the rhachis a faintly winged appearance; texture very delicate; stalk, though somewhat broad, appears to be thin, flat, weak, and membranaceous, with a few fine longitudinal striæ. Nerves, comparatively few, arising freely from base, and ascending dichotomously, and laxly, at a high angle (nearly parallel) to margin, the central nerve reaching apex, being only a little more prominent than the free lateral series. All the nerves are extremely fine, and are almost completely immersed in the delicate *pachypteris*-like tissue.

Length of larger pinnæ, about $1\frac{1}{2}$ inches; greatest breadth, about $\frac{1}{4}$ inch.

In form and general characteristics it comes very close to *Thinnfeldia indica*, Fstm., of the Indian Rajmahal Group. It differs from the latter, however, in having finer and more delicate nerves, and a more delicate texture. The nerves differ also in the manner in which the greater number spring freely from base instead of acutely arising mainly from central primary. The more or less parallel arrangement of the nerves also distinguishes the species from its allied Indian congener.

This interesting fern occurs in the Upper Mesozoic shales, Dunally, where it was collected by the Rev. J. Bufton, F.L.S. I have now great pleasure in associating its name with its accomplished discoverer.

Thinnfeldia polymorpha. (Nov. sp. Fig. 16.)

Frond bi-pinnate, dichotomous; pinnæ never dichotomous, distant, opposite, sub-opposite or alternate, extremely variable in form; generally linear-lanceolate, linear-ovate, and occasionally simply ovate; bases contracted and somewhat auricled; margins variously and irregularly sinuous, lobate, or simple; in some the lobes are confined to the base with narrow caudate extremities; in others the lobes, shallow and more or less irregular, are continuous throughout, and in a few they are simple or rudimentary. Stalk thick, and strongly grooved with an obscure nerve-like wing on either margin; each lobe has an independent set of fine branching nerves similar in character and arrangement to those of *Thinnfeldia obtusifolia*, Mihi., to which this strikingly variable form has a close affinity in many respects. Were it not that nearly every specimen of this polymorphous fern is similarly variable in the shales of Dunally, and the uniformly dichotomous and regularly lobed form of *T. obtusifolis* is rarely to be found there, I should hesitate in separating it from some extreme forms of the latter, but in any case the distinctive name now applied will serve a useful purpose for reference independently of doubt as to its true organic alliance. Length of the larger pinnæ, about $2\frac{1}{2}$ inches; greatest breadth towards base, $\frac{1}{4}$-$\frac{5}{16}$ inch.

Very common in Mesozoic shales near Dunally. Collected by the Rev. J. Bufton, F.L.S.

In my work on "The Geology of Tasmania" (Pt. xxvi,, figs. 2, 6, and 20) I refer certain doubtful forms to *Pecopteris caudata*, Mihi. I am now inclined to refer them to the above species, viz., *T. polymorpha*.

Genus Cardiopteris. *Schimper.*

The following definition of the above genus is taken from M. B. Renault, Cours de Botanique Fossils (Fougeres, pp. 201-202):—

"Frond pinée, rachis strié longitudinalement, cylindrique, pinnilles insérées perpendiculairment à la face supériurede ce dernier, rapprochées, imbriquèes, ovales, cordiformes, plus pitetes à la partie infériure des pennes où elles prennent une forme circulaire; toutes ont une forme smyétrique, et sont inséprées par le milieu de leur base, coriaces, à bords infèctus, nervures ègales naissant sur le rachis, plusieurs fois dichotomes, et sèpanouissant en éventail."

Terrain Houiller. France.

16.

17.

18.

K

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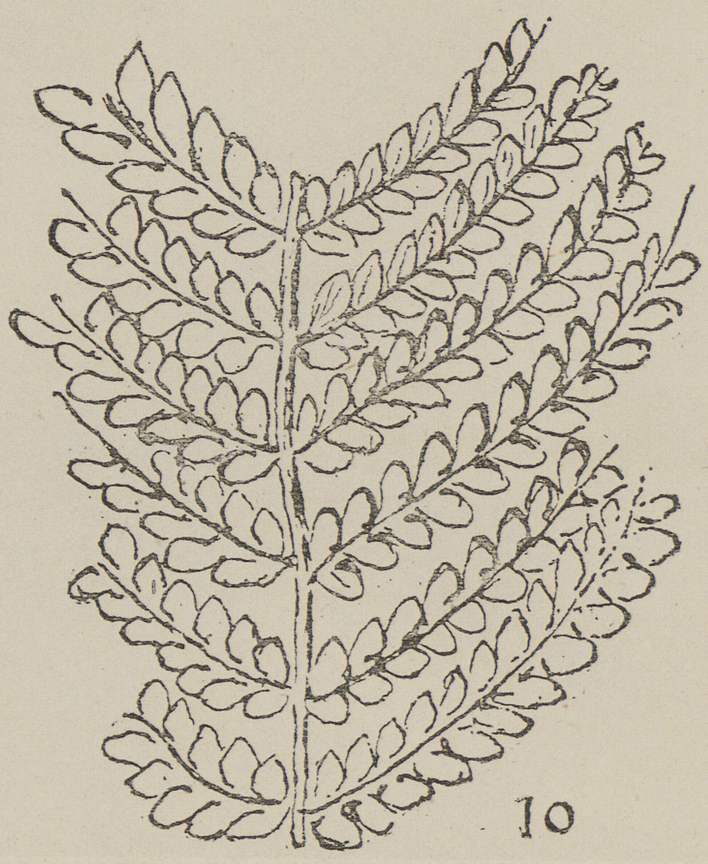

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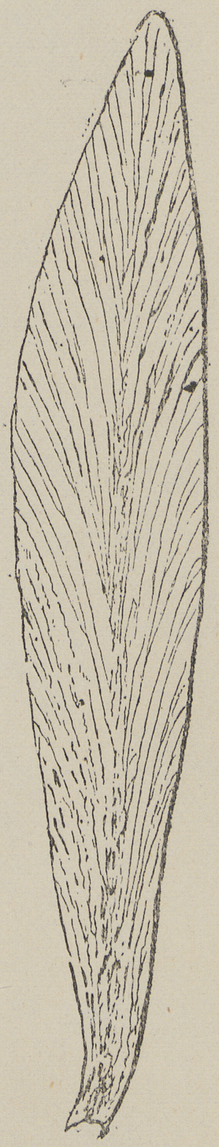
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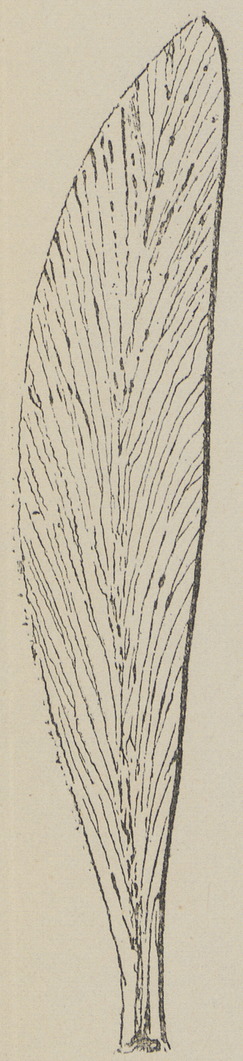
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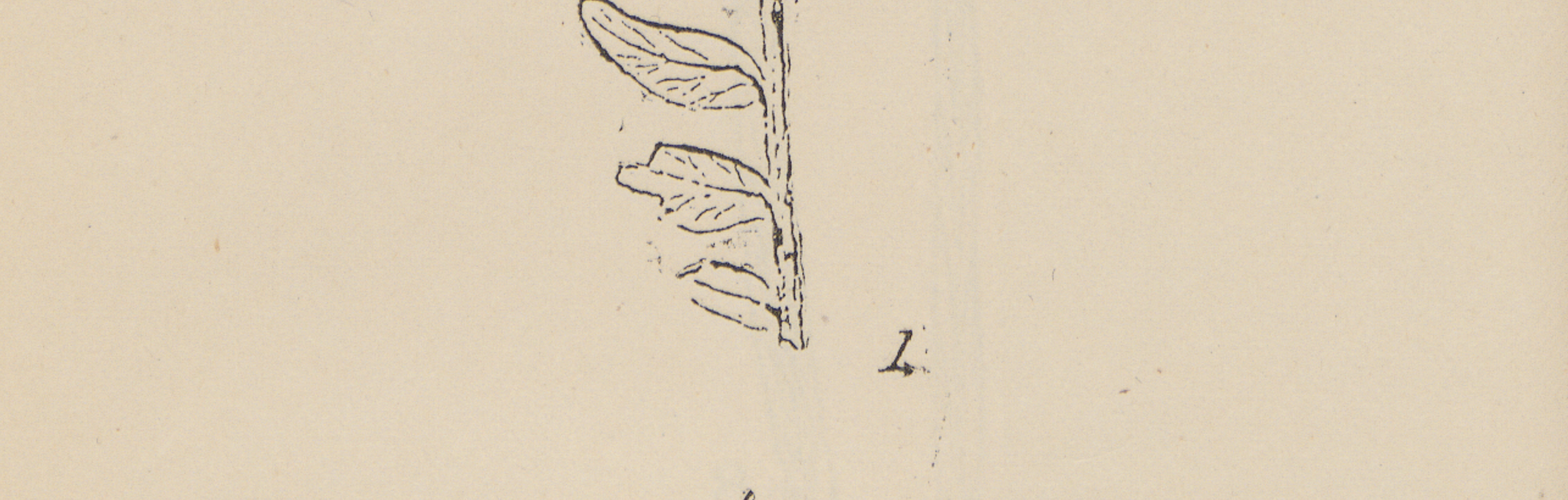

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Cardiopteris tasmanicus. (Nov. sp. Fig. 9.)

Frond reniform-cordate, deeply auricled. Nerves numerous, distinct, although somewhat immersed in a coriaceous membrane, and radiating from base attachment to margin regularly, arcuately, and dichotomously.

With the exception that it is more symmetrically rotund and more deeply auricled, it comes close to *Cardiopteris frondosa* (Goe p.), Schimper.

Greatest length, $\frac{14}{16}$ inch. Greatest breadth, $\frac{14}{16}$ inch.

Locality.—Altered Upper Mesozoic coal measure shales, near East Bay Neck, Tasman Peninsula, Tasmania.

Collected by the Rev. J. Bufton, Dunally.

Other Species of Plants Occurring in the Dunally Shales.

The greater part of the shales forwarded to me by the Rev. J. Bufton are much broken and friable, and the impressions are either obscure or very fragmentary. From a careful examination of these, however, I have, in addition to the forms already described, considerable confidence in referring a number of them to the following genera and species:—

Macrotæniopteris wianamattæ? Fstm.
Gleichenia dubia. Fstm. (Fig, 17.)
Trichomanides spinifolium. T. Woods.
Neuropteris tasmaniensis? R. M. Johnston. (Fig. 1.)
Ptilophyllum oligoneurum. T. Woods.
Pterophyllum. Sp.

Reference to Figures of Plants Described in this Paper.

Fig. 1. Probably a variety of the variable *Neuropteris tasmaniensis.* (R. M. Johnston.)
„ 2. *Thinnfeldia Feistenantelli.* (R. M. Johnston.)
„ 3. *Pecopteris Buftoni.* (Nov. sp.)
„ 4. *Pecopteris caudata.* (R. M. Johnston.)
„ 5, 6, 7. *Strzeleckia gangamopteroides.* (Nov. sp.)
„ 8. *Strzeleckia tenuifolia.* (Nov. sp.)
„ 9. *Cardiopteris tasmanica.* (Nov. sp.)
„ 10, 12. *Sphenopteris tasmanica.* (Nov. sp.)
„ 11, 13. Enlarged pinnules of 10-12.
„ 14. *Sphenopteris Morrisiana.* (Nov. sp.)
„ 15. Enlarged pinnules of 14.
„ 16. *Thinnfeldia polymorpha.* (Nov. sp.)
„ 18. *Thinnfeldia Buftoni.* (Nov. sp.)
„ 17. *Gleichenia dubia.* (Fstm.)